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Materiel Test Procedure 6-3-126
U.S. Army Aviation Test Board

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U.S. ARMY TEST AND EVALUATION COMMAND
COMMODITY SERVICE TEST PROCEDURE

AIRBORNE TRANSPONDERS, (IFF AND/OR AIR TRAFFIC CONTROL)

1. OBJECTIVE

This document provides existing test methods and techniques necessary to determine the degree to which airborne transponders, air traffic control and their auxiliary equipment and associated tools and test equipment (maintenance package) meet the requirements stated in Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), or Technical Characteristics (TC), and whether or not the system is suitable for Army use.

2. BACKGROUND

a. Airborne transponders provide a secondary radar target which differs from the primary radar target in that it is not a reflected signal from the ground radar transmitter but a "reflected" transmission from the transponder. This secondary radar target system is based upon three functions carried out jointly by ground and airborne components.

- 1) A ground component (interrogator) sends out groups of closely spaced radar pulses from an antenna synchronized with and usually mounted on the radar antenna.
- 2) The airborne component (transponder) within receiving range of the interrogator signal and set to the same mode, will be triggered and transmit a reply.
- 3) The reply transmitted by the airborne transponder is received by the air traffic control facility, and then displayed on the radarscope.

b. The earliest type of airborne transponder (IFF) was limited to a single mode with changeable codes and used primarily for identification of aircraft as friend or foe. Today, with the heavy increases in air traffic density, more sophisticated equipment with a wider range of capabilities is needed and used. The most recent type of airborne transponders, when used with designated auxiliary equipment, is able to provide automatic radar identification, identification of position, emergency signals and altitude reporting of the aircraft on which it is located to all suitably equipped interrogating air traffic control facilities within the operational range of the system. This airborne transponder receives, decodes, and replies to the characteristic interrogations of operational modes 1, 2, 3/A, C and 4. Also available are specially coded identification of position, emergency, and special position pulses which can be transmitted to interrogating air traffic control facilities. Lack of specifically designated

MTP 6-3-126
19 March 1971

auxiliary equipment (minimum configuration) does not prevent operation in modes 1, 2, and 3/A. Interrogation pulses for modes 1, 2, 3/A, C and 4 are transmitted on a frequency of 1030 mHz and are recognized by the transponder through pulse width and spacing. Modes 1, 2, 3/A and C each use two interrogation and one side lobe suppression pulse $.8 \pm .1 \mu$ sec wide. The side lobe suppression pulse for the above modes occurs $2 \pm 0.15 \mu$ sec after the leading edge of each initial pulse. Mode 4 interrogation pulse characteristics consist of four pulses $0.5 \pm .1 \mu$ wide, referenced from the leading edge of the first pulse, in multiples of two used. The four pulses may be followed by as many as 32 additional pulses spaced as close as two μ sec. The side lobe suppression pulse for mode 4 is spaced $8 \pm 0.15 \mu$ sec from the leading edge of the first pulse. The transponder reply information is transmitted on a frequency of 1090 mHz between two framing pulses spaced $20.3 \pm .05 \mu$ sec. The coded information between the two framing pulses is presented by presence, or absence, of pulses at predetermined spacings. In modes 1, 2 and 3/A the number of information pulses is a function of code dial settings on the transponder. In mode C this information is determined by the altimeter/encoder, and in mode 4 by an external computer. For mode 1 a reply pulse train is transmitted containing from zero to a maximum of five information pulses plus two framing pulses. The information pulse spacing is in multiples of $2.9 \pm 0.05 \mu$ sec from the initial framing pulse. The position where a sixth pulse would appear ($17.4 \pm 0.05 \mu$ sec from the initial framing pulse) is not used. From the specified five information pulses, a total of 32 different codes are available. For modes 2, 3/A, a reply pulse train is transmitted containing from zero to a maximum of 12 information pulses plus two framing pulses. The information pulse spacing is in multiples of $1.45 \pm 0.05 \mu$ sec from the initial framing pulse. The position where a seventh pulse would appear ($10.15 \pm 0.05 \mu$ sec from the initial framing pulse) is normally not used. From the specified 12 information pulses, a total of 4096 codes are available. For mode C when an altimeter/encoder is connected to the transponder, a reply pulse train is transmitted containing from one to a maximum of 11 information pulses plus two framing pulses. The information pulse spacing is in multiples of $1.45 \pm 0.05 \mu$ sec from the initial framing pulse. The positions where a seventh pulse ($10.15 \pm 0.05 \mu$ sec from initial framing pulse) and a ninth pulse ($13.05 \pm 0.05 \mu$ sec from initial framing pulse) would appear are not used. From the specified 11 information pulses, a total of 2048 codes are available. Mode 4 encoding is performed in an external computer. The increasing complexity of the airborne transponder and related air traffic control equipment requires a period of very comprehensive service testing to determine the suitability of such equipment for Army use.

3. REQUIRED SUPPORT

3.1 FACILITIES

- a. Suitable operational airfield(s) should be equipped with ATC and/or IFF interrogators.

MTP 6-3-126
19 March 1971

- b. Air space to conduct tests.

3.2

EQUIPMENT

weight.

- a. Measuring tools for determining system dimensions and
- b. Radio frequencies for air-to-ground communication.
- c. Photographic equipment.
- d. Binoculars.
- e. Appropriate number and types of test bed aircraft.
- f. Tactical mission support--as required.
- g. Avionics and electronic maintenance support-as required.
- h. Equipment required by referenced MTP's.

3.3.

PERSONNEL

Personnel in appropriate numbers, of the proper MOS and with special training as required.

4.

REFERENCES

- A. Army Regulation 385-16 Safety: Safety for Systems, Associated Subsystems, and Equipment.
- B. Army Regulation 750-6 Maintenance of Supplies and Equipment: Maintenance Support Planning.
- C. USATECOM Regulation 70-23 Research and Development: Equipment Performance Reports (EPRs).
- D. USATECOM Regulation 70-24 Research and Development: Documenting Test Plans and Reports.
- E. USATECOM Regulation 108-1 Photographic Coverage. (As implemented by USAAVNTBD Memo 108-1).
- F. USATECOM Regulation 385-6 Safety: Verification of Safety of Materiel During Testing.
- G. USATECOM Regulation 700-1 Quality Assurance: Value Engineering.
- H. USATECOM Regulation 750-15 Maintenance of Supplies and Equipment: Maintenance Evaluation During Testing.
- I. MIL-STD-129 Marking for Shipment and Storage.
- J. MIL-STD-130 Identification Marking of US Military Property.
- K. MIL-STD-882 System Safety Program for Systems and Associated Subsystems and Equipment: Requirements for.
- L. MTP 6-3-501 Pre-Test Inspection for Service Test.
- M. MTP 6-3-502 Personnel Training Requirements.
- N. MTP 6-3-506 Durability.
- O. MTP 6-3-509 Effects of Weather.
- P. MTP 6-3-513 Qualitative Electromagnetic Interference.
- Q. MTP 6-3-514 Qualitative Frequency Accuracy and Stability.
- R. MTP 6-3-515 Reliable Communication Range.
- S. MTP 6-3-517 Electrical Power Requirements.

MTP 6-3-126
19 March 1971

- T. MTP 7-3-066 Approach Systems (Terminal Air Traffic Control Facility).
- U. MTP 7-3-500 Physical Characteristics.
- V. MTP 7-3-502 Installation Characteristics.
- W. MTP 7-3-506 Safety.
- X. MTP 7-3-507 Maintenance.
- Y. MTP 7-3-508 Reliability.
- Z. MTP 7-3-509 Compatibility with Related Equipment.
- AA. MTP 7-3-510 Human Factors.
- AB. MTP 7-3-514 Adequacy of Technical Manuals.
- AC. MTP 7-3-519 Photographic Coverage.
- AD. QMR, SDR, or TC for airborne transponders, air traffic control

5. SCOPE

5.1 SUMMARY

This materiel test procedure describes tests for evaluating airborne transponders operated in conjunction with air traffic control facilities. Tests will be conducted by aircraft equipped with the airborne transponder and designated auxiliary equipment, if available, directed and controlled by an air traffic control facility suitably equipped with compatible interrogating equipment and auxiliary equipment. Both airborne and ground equipment will be operated and maintained by test personnel representative of those skills normally assigned to such equipment. The suitability of the airborne transponder will be evaluated against the requirements of applicable QMR, SDR, TC or other approved documents.

5.1.1 Preparation for Test

This section provides guidance for test project planning, facility and equipment requirements, and instructions for test personnel familiarization.

5.1.2 Test Conduct

The tests and evaluations are arranged in a logical sequence to provide a step-by-step analysis of the suitability of the airborne transponder system to perform its prime functions in conjunction with air traffic control facilities provided with compatible equipment. The specific tests to be performed, and their intended objectives, are listed below:

a. Initial Inspection -- To determine the receipt of a complete or a minimum configuration airborne transponder system and its condition upon receipt.

b. Installation Characteristics -- To determine the ease of installation and removal of the airborne transponder system.

MTP 6-3-126
19 March 1971

c. Electrical Power Requirements -- To determine the adequacy of the electrical power sources to meet the requirements for operation of the airborne transponder system.

d. Operational Performance -- To determine the adequacy and suitability of the airborne transponder system to perform its mission by evaluating its reliable range and frequency accuracy and stability.

e. Compatibility with Related Equipment -- To determine the suitability of the airborne transponder system for operation with related equipment in various configurations, and in operational modes 1, 2, 3/A, C, and 4.

f. Electromagnetic Interference -- To determine qualitatively the existence of interference from the airborne transponder system to collocated equipment, and interference to the transponder system by collocated equipment.

g. Durability -- To evaluate the time in service, failure potential of components and durability of the airborne transponder system during operation.

h. Effects of Weather -- To determine the capabilities and limitations imposed upon the operation of the airborne transponder system due to the extremes of weather.

i. Maintenance Evaluation -- To determine the maintenance/maintainability requirements of the airborne transponder system and determine the adequacy of the maintenance test package (tools and test equipment, equipment technical manuals, and repair parts).

j. Maintainability -- An evaluation to determine adequacy of design characteristics which is expressed as the probability that an item will be retained in or restored to a specified condition within a given period time, when maintenance is performed in accordance with prescribed procedures and resources.

k. Reliability -- An evaluation to determine the probability that an item will perform its intended function for a specified interval under stated conditions.

l. Achieved Availability -- To evaluate the probability that the airborne transponder system, when used under stated conditions in an ideal support environment (total availability of tools, parts, manpower, manuals, etc.), shall operate satisfactorily at any given time.

m. Safety -- To determine factors that are detrimental to user safety throughout the period of testing.

MTP 6-3-126
19 March 1971

n. Human Factors -- To determine if the airborne transponder/system is designed so as to comply with accepted human factors engineering principles.

o. Personnel Training Requirements -- To determine the scope and effectiveness of pretest training associated with operating and maintaining the airborne transponder system and needs for additional training.

5.1.3 Test Data

This section details the data to be collected and recorded while completing the test procedures in section 6.2, Test Conduct.

5.1.4 Data Reduction and Presentation

This section provides instructions for evaluating and displaying the data recorded during testing.

5.2 LIMITATIONS

This MTP is limited to service testing of the airborne transponder as a complete system or in the minimum equipment configuration (not including designated auxiliary equipment required for altitude reporting and mode 4 operation). It is not intended for service testing of interrogation and auxiliary equipment installed and operated at the air traffic control facility.

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Test Planning

Formulate a plan of test utilizing reference 4.D. and the following general procedures:

a. Review

- 1) QMR, SDR and TC.
- 2) Other applicable sources of criteria.
- 3) Instructional material available from the manufacturer.
- 4) All reports of previous tests conducted on like types of equipment.

b. Prepare a detailed test schedule showing proposed time periods allotted for each test listed in section 5.1.2. Ensure that a sufficient number of samples of all measurements are taken to provide statistical confidence in the final data.

c. Prepare necessary forms for entry of test data.

MTP 6-3-126
19 March 1971

d. Determine adequate safety measures necessary to provide safety for personnel and equipment, and ensure that safety SOP's are observed throughout the test. Safety release or confirmation will be obtained in accordance with reference 4.F.

e. Plan to utilize photographic techniques where possible to record and document findings and results of testing (see reference 4.E).

6.2 TEST CONDUCT

NOTE: Subtests shall be conducted concurrently with, or in conjunction with other subtests, whenever possible, so that the time needed to collect the required data will be minimized.

6.2.1 Initial Inspection

6.2.1.1 Visual Inspection

Perform the following:

a. An inventory check against the Basic Issue Item List (BIIL), submitting an Equipment Performance Report for shortages or discrepancies in accordance with the provisions of reference 4.C.

b. Pretest inspection procedures required by reference 4.L. to include the following:

- 1) Visually inspect for defects.
- 2) Remove all preservatives.
- 3) Check for completeness of assembly.
- 4) Maintenance support package.

6.2.1.2 Physical Characteristics

Determine the physical characteristics of the airborne transponder system by weighing and measuring each major item according to the procedures of reference 4.U. Photograph the equipment.

6.2.2 Installation Characteristics

Perform the applicable procedures of reference 4.V. and observe for the following:

- a. Ease of installation and removal.
- b. Equipment flexibility for arrangement and mounting.
- c. Accessibility for operation and maintenance.

MTP 6-3-126
19 March 1971

6.2.3 Electrical Power Requirements

Using applicable procedures of reference 4.S. determine the suitability of aircraft electrical power sources designated by QMR or SDR for operation of the airborne transponder system.

6.2.4 Operational Performance

Evaluate the operational performance of the airborne transponder system as a function of reliable range and frequency accuracy and stability.

a. Reliable Range

To determine the maximum and minimum reliable ranges of the airborne transponder system, use the procedures of reference 4.R. as a guide and proceed as follows:

- 1) Establish a two-way communications net between the test bed aircraft and the air traffic controller.
- 2) Operate the airborne transponder on normal sensitivity.
- 3) Have aircraft proceed from over the air traffic control facility outbound on a cardinal heading. Aircraft altitudes for the purpose of this test will be determined by the selected operational criteria described in applicable QMR, SDR or TC.
- 4) Jointly exercise the airborne transponder system and ground interrogator in the various modes, codes and special operation features while observing the radarscope for maximum range at which loss of signal occurs. In coordination with Civil air traffic control facilities, operate the transponder in modes 1, 2, 3/A and C in flight profiles which are both appropriate for the particular test bed Army aircraft being used, and in simulation of civil air traffic on the federal airway system in conditions of instrument flight. In coordination with military air defense facilities operate the transponder in mode 4 in flight profiles appropriate for the (tactical mission) test bed employed. Conduct a minimum of five such flights per test installation per profile. Collect transponder performance data from the ground (interrogation) facility operator.
- 5) Have aircraft reverse course and proceed inbound until transponder signals are observed on radarscope. Repeat procedures of paragraph 6.2.4a.3) above observing signal quality in vicinity of air traffic control facility and range at which loss of signal occurs.
- 6) On random headings, and at arbitrarily selected ranges, execute 360° turns to determine transponder reliability during the turn maneuver. Conduct the test at gradually increasing ranges to determine the effect of range on reliability and reception.

MTP 6-3-126
19 March 1971

b. Qualitative Frequency, Accuracy and Stability

Throughout the period of turn-on, operation and turn-off of the airborne transponder system, perform the applicable procedures of reference 4.Q. to determine the qualitative frequency, accuracy and stability of the system.

6.2.5 Compatibility with Related Equipment

Perform applicable sections of reference 4.Z. to determine any lack of electrical and mechanical compatibility that may exist between airborne transponder systems and aircraft equipment with which they are required to operate.

6.2.6 Electromagnetic Interference

Operate the airborne transponder system with collocated equipment, as described in applicable sections of reference 4.P., to determine effects of any objectional electromagnetic interference.

6.2.7 Durability

Throughout the entire service testing period, monitor the durability of the airborne transponder system in accordance with the applicable procedures of reference 4.N.

6.2.8 Effects of Weather

Throughout the entire period of service testing, operate the airborne transponder system under all conditions of existing weather as described in the procedures of reference 4.O.

6.2.9 Maintenance Evaluation

Perform the maintenance requirements as detailed in reference 4.H. and 4.X. Utilize personnel possessing the appropriate MOS and skill levels, tools and test equipment, technical manuals, and repair parts for the prescribed level of maintenance. Log all maintenance actions required for retaining equipment in, or restoring it to, specified conditions on Maintenance Analysis Chart described in reference 4.H.

a. Tools and Test Equipment

Throughout the conduct of the service test, evaluate the use of common and special tools and test equipment to determine whether they are suitable and needed for the intended purpose and prescribed maintenance level. Perform the applicable procedures of references 4.H. and 4.X. Log all relevant findings in the Special Tool Analysis Chart described in reference 4.H.

MTP 6-3-126
19 March 1971

b. Technical Manuals

Evaluate the adequacy and simplicity of the equipment technical manuals for their intended maintenance levels as specified in references 4.H. and 4.AB. Log all pertinent data and comments in the Maintenance Package Literature Chart described in reference 4.H.

c. Repair Parts

Evaluate the adequacy and quantity of repair parts provided for all levels of maintenance in accordance with the procedures of references 4.H and 4.X. Log all pertinent data and comments in the Parts Analysis Chart described in reference 4.H.

6.2.10 Maintainability

Throughout the entire period of service testing, assess the maintainability characteristics of the airborne transponder system in accordance with reference 4.H. and evaluate the following:

- a. Whether the system meets the maintainability design requirements specified by QMR, SDR, TC, or other established criteria.
- b. Whether the time required for individual maintenance operations is considered excessive based on previous experience with similar equipment.
- c. The ease of access to facilitate inspection, test, repair and replacement.
- d. The maximum utilization of interchangeable components.
- e. The maximum utilization of common tools for maintenance operations.
- f. Whether major components are designed for removal as individual units.
- g. The existence of conditions which will adversely affect the conduct of maintenance operations or generate excessive maintenance requirements.

6.2.11 Reliability

Beginning with the initial installation and checkout of the airborne transponder system, assess the reliability characteristics of the system in accordance with reference 4.Y. Make maximum use of the data collected and logged on the special analysis charts used in evaluating the maintenance test package as described in reference 4.H.

MTP 6-3-126
19 March 1971

6.2.12 Achieved Availability

To evaluate the achieved availability of the airborne transponder system, ensure that sufficient data is logged on the special analysis charts described in paragraph 6.2.9 to be able to determine the two factors, mean-time-between-maintenance (MTBM) and mean active maintenance downtime (\bar{M}) resulting from both preventive and corrective maintenance actions. At the completion of service testing, extract and summarize this data and compute achieved availability (A_a) using the following formula:

$$A_a = \frac{\text{MTBM}}{\text{MTBM} + \bar{M}} \quad (\text{references 4.H. and 4.X.})$$

6.2.13 Safety

a. Throughout the conduct of all testing as outlined in this MTP, monitor all safety aspects associated with airborne transponder systems in accordance with reference 4.W.

b. Provide safety confirmation in accordance with the provisions of reference 4.F.

c. In addition to data required by reference 4.W., record comments concerning the following:

- 1) Analysis to establish that no foreseeable hazards are present during testing or operation of airborne transponder systems.
- 2) Inspection for high voltage hazard control and adequacy of protective devices to include interlocks and warning placards.
- 3) Evaluation of any hazards, including radiological hazards, associated with storage, transportation, operation, and maintenance of airborne transponder systems.

6.2.14 Human Factors Evaluation

a. Throughout testing, monitor and appraise human factors to identify design or operational features conducive to error and delay in mission accomplishment by user personnel in accordance with the procedures given in reference 4-AA.

b. Prepare checklists for all tasks associated with all phases of operation and maintenance. These checklists shall be used to rate each task as satisfactory or unsatisfactory; include the following:

- 1) Communications quality of instructions as indicated by the ease of understanding technical manuals.
- 2) System design to the extent of personnel compatibility with instrument arrangement, controls, etc.

MTP 6-3-126
19 March 1971

- 3) Minimum and optimum number of personnel for each action and the skill level(s) required.
- 4) Time(s) required.

6.2.15 Personnel Training Requirements

a. Throughout the testing, monitor and evaluate all operator and organizational maintenance personnel training requirements in accordance with reference 4.M.

b. In addition to the data required by reference 4.M., record narrative comments concerning the following training factors:

- 1) Scope and effectiveness of pretest training.
- 2) Need for additional training in the same or different fields.

6.3 TEST DATA

6.3.1 Preparation for Test

Data to be recorded prior to testing shall include, as a minimum, the following:

a. Nomenclature, serial number(s), manufacturer's name, and function of the item(s), accuracy tolerances, calibration requirements, and last date calibrated of the test equipment.

b. Damages incurred during transit and/or manufacturing.

6.3.2 Test Conduct

a. Data originating in all tests and phases shall be recorded in the following forms, as appropriate.

- 1) Operators', observers', and test controllers' records, questionnaires, etc.
- 2) Narrative comments and observations.
- 3) Maintenance records.
- 4) Photographs; still and movie.
- 5) Diagrams and sketches.

b. All data items shall be properly identified and annotated with respect to:

- 1) Test, subtest, test phase.
- 2) Source.
- 3) Time.
- 4) Pertinent correlative information.

MTP 6-3-126
19 March 1971

c. Data to be recorded in addition to specific instructions given in succeeding paragraphs for each subtest shall include:

- 1) Sample size (number of measurement repetitions).
- 2) Instrument or measurement system mean error stated accuracy.

6.3.2.1 Initial Inspection

6.3.2.1.1 Inventory Check and Visual Inspection

Record the following:

- a. Evidence of damage incurred during transport or storage.
- b. Exterior identification markings of the shipment in accordance with reference 4.I. or other governing documents.
- c. Interior markings of shipment in accordance with reference 4.J. or other governing documents.
- d. Physical condition.
- e. The completeness of the shipment when individually received items are compared against the BIIL. Also, indicate the existence of materiel discrepancies in the shipment and the number of EPRs which were prepared.

6.3.2.1.2 Physical Characteristics

- a. Record weight and measurements of each major unit of the air-borne transponder system according to the procedures of reference 4.U.
- b. Identify and retain all photographs taken.

6.3.2.2 Installation Characteristics

Record the data required by reference 4.V. including comments on the following:

- a. Ease of installation and removal.
- b. Equipment flexibility for arrangement and mounting.
- c. Accessibility for operation and maintenance.

6.3.2.3 Electrical Power Requirements

Record data required by reference 4.S.

MTP 6-3-126
19 March 1971

6.3.2.4 Operational Performance

Record the following:

a. Reliable Range

- 1) Applicable data required by reference 4.R.
- 2) Aircraft headings and altitudes flown.
- 3) Maximum and minimum ranges for each mode, code, and special operation exercised using normal sensitivity.
- 4) Repeat data of paragraph 6.3.2.4a. 2) and 3) for low sensitivity operation.

b. Qualitative Frequency, Accuracy and Stability

Applicable data required by reference 4.Q.

6.3.2.5 Compatibility with Related Equipment

Record data required by reference 4.Z.

6.3.2.6 Electromagnetic Interference

Record applicable data requirements of reference 4.P.

6.3.2.7 Durability

Record data requirements of reference 4.N.

6.3.2.8 Effects of Weather

Record data required by applicable procedures of reference 4.O.

6.3.2.9 Maintenance Evaluation

Record data required by references 4.H. and 4.X. and complete the following forms:

a. Maintenance Analysis Chart.

b. Special Tool and Test Equipment Chart.

c. Maintenance Package Literature Chart.

d. Parts Analysis Chart.

6.3.2.10 Maintainability

Record applicable requirements of reference 4.H. and comments on the following:

MTP 6-3-126
19 March 1971

- a. Degree of accomplishment of the maintainability design requirements of QMR, SDR, TC, or other established criteria.
- b. Maintenance time required as compared to previous experience on similar equipment.
- c. Ease of access for inspection, test, repair and replacement.
- d. Utilization of interchangeable components.
- e. Utilization of common tools for maintenance.
- f. Design of major components for removal as individual units.
- g. Conditions which will adversely affect maintenance operations.

6.3.2.11 Reliability

Record data required by reference 4.Y.

6.3.2.12 Achieved Availability

Record the following:

- a. Mean-time-between-maintenance (MTBM).
- b. Mean active maintenance downtime (\bar{M}).

6.3.2.13 Safety

Record the following:

- a. Data in accordance with reference 4.W.
- b. Comments concerning safety confirmation.
- c. Analysis of foreseeable hazards associated with operation of the equipment.
- d. Results of inspection of high voltage hazard control.
- e. Evaluation of possible hazards, including radiological, associated with storage, transportation, and maintenance of the equipment.

6.3.2.14 Human Factors Evaluation

Record the following:

- a. Data in accordance with reference 4.AA.

MTP 6-3-126
19 March 1971

- b. Test phases on motion picture film.
- c. Times of accomplishment of phases in hours and minutes.
- d. Comments pertaining to the capability of average trained operator and maintenance personnel to operate and maintain airborne transponder systems.

6.3.2.15 Personnel Training Requirements

- a. Record data in accordance with reference 4.M.
- b. Record comments concerning the scope and effectiveness of pretest training and any needs for additional training.

6.4 DATA REDUCTION AND PRESENTATION

6.4.1 Data Reduction

Processing of raw data shall, in general, consist of organizing, marking for identification and correlation, and grouping the test data according to subtest title. Test criteria or specifications shall be noted on the test data presentation to facilitate analysis and comparison. Where necessary, test data measurement units shall be converted to be compatible with units given by test criteria or specifications.

6.4.2 Data Presentation

Presentation of test results shall consist of:

- a. A composite documentation of the reduced and correlated data arranged by test phases in the general form of narrative description supported by diagrams, photographs, graphs, and tabular data. Mission aspects to be made clearly evident are the degree to which the aircraft transponder system provides automatic radar identification, identification of position, emergency signals, and altitude reporting of aircraft in flight.

- b. Supplements or annexes to the basic document, delineating the common service test factors which are of sufficient scope, importance and/or complexity to warrant separate treatment. Each supplement shall include the applicable supporting data.

- c. A further analysis to determine the extent to which the airborne transponder system under test exceeds the performance characteristics or otherwise provides distinct advantages over existing Army equipment providing the same requirements.

- d. Recommendations as to the suitability of the airborne transponder system(s) and its maintenance test package for use by the Army.

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| | ROLE | WT | ROLE | WT | ROLE | WT |
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| IFF | | | | | | |